constituent of the LED array chip 3002. However, the third embodiment is not limited to such. Similarly to the first to third modification examples of the second embodiment, the cylinder member 3006 (the multilayer epitaxial structure) is first formed by epitaxial growth on a single-crystal substrate (e.g. a sapphire substrate) which is different from the SiC substrate 3004, and then transferred to the SiC substrate 3004. In other words, the SiC substrate 3004 which is a base substrate constituting the LED array chip 3002 may or may not be a substrate on which the cylinder member 3006 (the multilayer epitaxial structure) is formed by epitaxial growth.

Industrial Applicability

As describe above, a semiconductor light emitting device relating to an embodiment of the present invention is applicable to a lighting apparatus. This is because a light emitting device used for a lighting apparatus needs to be tested for its optical performance, for example, unevenness of color, before being mounted on the lighting apparatus.

CLAIMS

1. A semiconductor light emitting device comprising:

a base substrate;

a multilayer epitaxial structure that includes a first conductive layer, a second conductive layer and a light emitting layer that is formed between the first conductive layer and the second conductive layer, the multilayer epitaxial structure being formed on the base substrate in such a manner that the first conductive layer is positioned closer to the base substrate than the second conductive layer is; and

a phosphor film that covers a main surface of the multilayer epitaxial structure which faces away from the base substrate, and every side surface of the multilayer epitaxial structure from a layer including the main surface to include at least the light emitting layer.

2. The semiconductor light emitting device of Claim 1, wherein

the multilayer epitaxial structure is epitaxially grown on the base substrate.

3. The semiconductor light emitting device of Claim 2, wherein

the multilayer epitaxial structure further includes

a reflective layer which is formed between the base substrate and the first conductive layer.

4. The semiconductor light emitting device of Claim 3, wherein

the reflective layer is made of an AlGaN semiconductor.

5. The semiconductor light emitting device of Claim 2, further comprising:

a first electrode that is formed on the first conductive layer;

a second electrode that is formed on the second conductive layer;

a first power supply terminal and a second power supply terminal that are formed on a main surface of the base substrate which faces away from the multilayer epitaxial structure;

a first conductive member including a first through hole that is provided in the base substrate, and electrically connecting the first electrode and the first power supply terminal; and

a second conductive member including a second through hole that is provided in the base substrate, and electrically connecting the second electrode and the second power supply terminal.

6. The semiconductor light emitting device of Claim 5, wherein

the multilayer epitaxial structure is formed on the base substrate leaving a space along each edge of a main

surface of the base substrate which faces the multilayer epitaxial structure, and

the first through hole and the second through hole are provided in a peripheral portion of the base substrate, the peripheral portion corresponding to the space.

7. The semiconductor light emitting device of Claim 2,

the base substrate is made of one of SiC, AlN, GaN, BN, and Si.

8. The semiconductor light emitting device of Claim 2, wherein

the main surface of the multilayer epitaxial structure which faces away from the base substrate is uneven so as to improve light extraction efficiency.

9. The semiconductor light emitting device of Claim 2, wherein

light emitted from the light emitting layer has a wavelength component within a range of 380 nm to 780 nm.

10. The semiconductor light emitting device of Claim 1, wherein

the multilayer epitaxial structure is first epitaxially grown on a single-crystal substrate, and then transferred to the base substrate.

11. The semiconductor light emitting device of Claim 10,

further comprising:

a metal reflective film that is sandwiched between the multilayer epitaxial structure and the base substrate.

12. The semiconductor light emitting device of Claim 10, wherein

the first conductive layer is a p-type semiconductor layer, and

the second conductive layer is an n-type semiconductor layer.

13. The semiconductor light emitting device of Claim 12, wherein

a main surface of the n-type semiconductor layer which faces away from the light emitting layer is uneven so as to improve light extraction efficiency.

14. The semiconductor light emitting device of Claim 1, wherein

the multilayer epitaxial structure is shaped as a cylinder having a substantially circular or N-sided polygonal cross-section, where N is an integer equal to or larger than five.

15. The semiconductor light emitting device of Claim 14, wherein

the phosphor film is applied at a substantially same thickness.

16. The semiconductor light emitting device of Claim 14, wherein

the main surface of the base substrate which faces the multilayer epitaxial structure is rectangular.

17. The semiconductor light emitting device of Claim 14, wherein

the multilayer epitaxial structure further includes a light reflective layer which is formed between the first conductive layer and the base substrate.

18. The semiconductor light emitting device of Claim 14, wherein

the multilayer epitaxial structure is epitaxially grown on the base substrate.

19. The semiconductor light emitting device of Claim 14, wherein

the multilayer epitaxial structure is divided into a plurality of portions by a division groove that reaches the base substrate, the plurality of portions being a plurality of independent light emitting elements.

20. The semiconductor light emitting device of Claim 19, wherein

in each of the plurality of independent light emitting elements,

a first electrode is formed on a part of a main surface of the first conductive layer, the part being created by partially removing the second conductive layer and the light emitting layer, and a second electrode is formed on a main surface of the second conductive layer, and

the plurality of independent light emitting elements are connected with each other in series in such a manner that a first electrode of one independent light emitting element is connected to a second electrode of another independent light emitting element using a wiring formed by a thin metal film.

21. The semiconductor light emitting device of Claim 20, wherein

the light emitting layer included in each independent light emitting element has a substantially same area.

22. A light emitting module comprising:

a printed-wiring board; and

a semiconductor light emitting device claimed in one of Claims 1 to 21, and is mounted on the printed-wiring board.

23. A lighting apparatus including a light emitting module claimed in Claim 22.

24. A display element including, as a light source, a semiconductor light emitting device claimed in one of Claims 1 to 21.

25. A manufacturing method of a semiconductor light emitting device, comprising steps of:

forming a multilayer epitaxial structure including a light emitting layer on a main surface of a base substrate by epitaxial growth;

dividing the multilayer epitaxial structure into a plurality of portions by removing a part of the multilayer epitaxial structure so as that an area of the main surface of the base substrate is externally exposed;

forming a phosphor film that covers the exposed area of the main surface of the base substrate and all exposed surfaces of each of the plurality of portions; and

dicing the base substrate according to each of the plurality of portions.

26. A manufacturing method of a semiconductor light emitting device, comprising steps of:

forming a multilayer epitaxial structure including a light emitting layer on a main surface of a single-crystal substrate by epitaxial growth;

forming a first metal film on an outmost layer of the multilayer epitaxial structure;

forming a second metal film on a base substrate;

connecting the single-crystal substrate and the base substrate in such a manner that the first metal film is connected to the second metal film;

separating the single-crystal substrate from the

multilayer epitaxial structure;

dividing the multilayer epitaxial structure into a plurality of portions each of which is the semiconductor light emitting device, prior to the adhering step or subsequent to the separating step;

forming a phosphor film that covers all exposed surfaces of each of the plurality of portions, subsequent to the separating step and the dividing step; and

dicing the base substrate according to each of the plurality of portions.

27. A manufacturing method of a semiconductor light emitting device, comprising steps of:

forming a multilayer epitaxial structure including a light emitting layer on a main surface of a base substrate by epitaxial growth;

dividing the multilayer epitaxial structure into a plurality of cylinder members by removing a part of the multilayer epitaxial structure, each of the plurality of cylinder members having a substantially circular or N-sided polygonal cross-section, where N is an integer equal to or larger than five;

forming a phosphor film that covers all exposed surfaces of each cylinder member; and

dicing the base substrate according to an area including each cylinder member.

28. The manufacturing method of Claim 27, further comprising

a step of:

creating a groove that reaches the base substrate, within each of the plurality of cylinder members, to divide the cylinder member into a plurality of portions.